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ABSTRACT

The state-of-the-art of financial analysis for academic units within institutions of higher education is evaluated with attention directed to: how the cost of an academic unit is determined, how revenue is identified with academic units, how costs are analyzed, how revenues and expenditures are projected, and how the financial efficiency of an academic unit is evaluated. Based on the literature, it is suggested that: indirect as well as direct costs need to be measured; cost has both fixed and variable elements in relation to the number of students or faculty in an academic unit; in some analytical models, the revenue attributable to an academic unit is measured; costs per student, per full-time equivalent faculty, and per class are measures of unit cost; level of study, method of instruction, and other factors are used to weight data about cost per student; the expected cost of an academic unit may be measured by determining its level of average faculty support and workload; and financial measures may yield important information, but the use of the information still requires discretion. Accounting for revenues of academic units is not as well developed as accounting for costs. Where actual revenue attributable to a unit is not available in the accounts, some form of allocation system is used. Mathematical models, such as trend line analysis and the cohort-survival technique offer means for projecting future enrollment and consequently revenue and expenditures that vary according to enrollment. Relating cost to quality, or fiscal efficiency to program effectiveness may result in misuses of quantitative data. A bibliography is appended. (SW)

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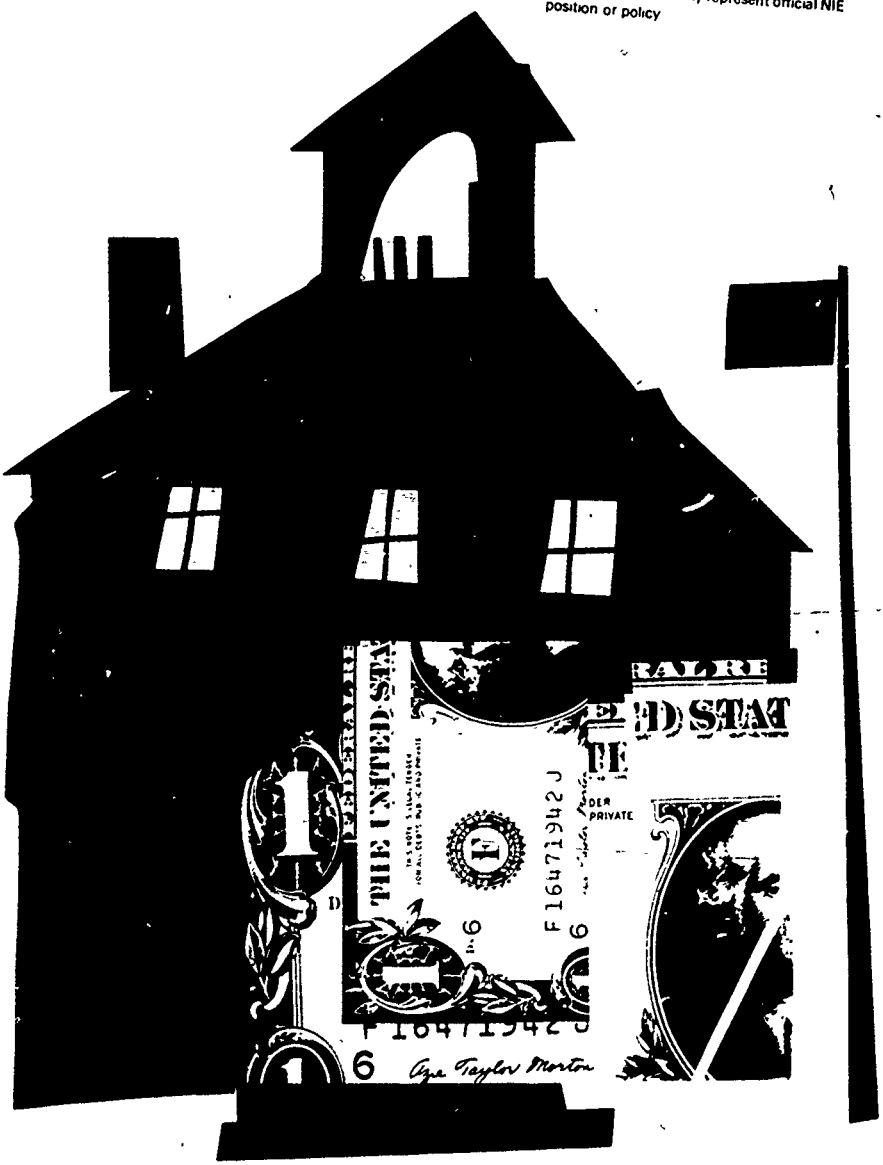
Financial Analysis for Academic Units

Donald L. Walters



AAHE

Financial Analysis for Academic Units

Donald L. Walters

AAHE-ERIC/Higher Education Research Report No. 7, 1981

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ERIC® Clearinghouse on Higher Education
The George Washington University
One Dupont Circle, Suite 630
Washington, D.C. 20036

American Association for Higher Education
One Dupont Circle, Suite 600
Washington, D.C. 20036

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Contents

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Gratitude is expressed to the staff of the Samuel S. Paley Library, Temple University, for maintaining an ERIC collection and for providing a microfiche reader for use in the review. Frank Azeke, a doctoral student studying the administration of higher education at Temple University, provided valuable service in conducting preliminary reviews of many ERIC documents.

The ERIC Clearinghouse on Higher Education, under the direction of Jonathan D. Fife, provided an excellent computerized search of the ERIC literature base and offered encouragement along the way. The author is grateful for the ERIC system and the support it has received from the U.S. Congress and the federal executive branch. This means of facilitating the exchange of ideas and research findings has done much to improve the well-being of all our citizens.

Foreword

There are many reasons for an institution to gather financial information—related to both revenue and expenses—on its individual academic units. Among them:

General Accountability: Legislators and boards of trustees are less inclined to accept gross financial data concerning the financial relationship of individual academic units to each other and to the institution.

Financial Accuracy: In a time of scarce revenues, people with budget-making responsibility are less willing to accept budget requests without examining past financial history. The question raised is: Does the proposed budget in fact reflect accurately the expenses and income as based on past experience and projected activities?

Financial Contribution/Drain: When expenses exceed income, there is a need to examine the contribution of an academic unit to the institution as a whole. Not only must the educational mission of the institution be considered; demand for and cost of operation of the academic unit must also be examined.

Long-Term Efficiency of the Academic Unit: The efficiency of a unit in private business is often based on cost of production. Long-term effectiveness is measured by increases or decreases in per-unit production costs. This type of data is desirable for academic institutions in order to assess academic efficiency and stability.

This information can be used in a variety of ways, including part of an overall analysis to assess and improve the academic strength of an institution. It can also be used in determining the survival of a particular academic program. No matter how the information is used, the collection of such data may be perceived by members of the academic unit as threatening—often because of a general suspicion toward the relevancy of this financial information to the educational process.

In this Research Report, Donald L. Walters, professor of educational administration at Temple University, has presented a synthesis of the literature concerning the financial analysis of academic units. Through this synthesis, both faculty and administrators will gain a better understanding of the variables related to financial analysis and of how this analysis may be relevant to the academic process. It is hoped that with an increased understanding of this process, faculty and administrators can more harmoniously work together in the collection, analysis, and use of financial data concerning academic units.

Jonathan D. Fife
Director
ERIC® Clearinghouse on Higher Education
The George Washington University

Overview

The Veep is in the office
Counting S-C-H's.*
The prof is in the classroom
Where he or she teaches,
The dean of the college
Is writing academic goals,
When along comes the budget...
And away they all go!
(with apology to Mother Goose)

The 1970s brought new concerns about the financing of higher education. The growth of enrollment, which had been boosted to record highs by the post-World War II baby boom, began to decline. The value of a college diploma was questioned as underemployment and unemployment statistics about college graduates emerged. By the early 1980s, tax burdens began to yield to political views that government could no longer maintain, let alone extend, its financial support of higher education.

To cope with dwindling or limited resources, institutions of higher education more closely examined their use of those resources. Concerns about revenue moved to a new level. Administrators and faculty in more and more institutions began to feel personally the financial pinch. To understand the financial dimension of departments, divisions, and colleges within institutions of higher education, concerned administrators and faculty accelerated the search for useful techniques of analysis.

This monograph provides a view of the state of the art of financial analysis for academic units within institutions of higher education. It addresses several major questions:

1. How is the cost of an academic unit determined?
2. How is revenue identified with academic units?
3. How are costs analyzed?
4. How are revenues and expenditures projected?
5. How is the financial efficiency of an academic unit evaluated?

The review was delimited to financial analysis for academic units within institutions of higher education. An academic unit was defined as an instructional subunit—a department, program, division, or college—within an institution. The institution might be a public or private two-year college, four-year college, or university. Branch campuses were not treated as academic units per se; however, academic units might deliver instruction at branch campuses.

Financial analysis was delimited to the techniques and procedures applied to measure, assess, or evaluate financial data. Attention was centered on financial data pertaining to the ordinary operating cycle (fiscal year or less) of academic units.

*Student credit hours.

The findings reported in this monograph were derived from articles, papers, and reports identified primarily through a search of the ERIC document and journal files. The literature spans the 1970s.

For the most part, the literature describes practices in a single institution. Few comparisons of different techniques within an institution or among institutions are reported. The extent to which the findings can be generalized, therefore, must be weighed carefully. In light of this limitation, 10 findings show the general direction of thought and research on the topic:

1. The analysis of the cost of operating an academic unit is more complete when indirect costs as well as direct costs are measured. Indirect costs are identified and allocated through a variety of techniques.

2. Cost is recognized to possess both fixed and variable elements in relation to the number of students or faculty in an academic unit.

3. In some analytical models, the revenue attributable to an academic unit is measured. The attribution of revenue is usually based on a system of allocation.

4. Cost per student, as expressed by cost per student credit hour or cost per full-time equivalent student, is used most often to represent unit cost. Cost per class and cost per full-time equivalent faculty are alternative measures of unit cost.

5. Level of study, method of instruction, size of class, etc., are used to weight data about cost per student. Cost per student credit hour is a questionable measure to apply to graduate degree programs.

6. The expected cost of an academic unit may be measured by determining its level of average faculty support and workload.

7. Valid and reliable data about student enrollment and faculty activity are difficult to obtain.

8. Mathematical models exist to assist in the projection of revenue and expenditures, but their use is seldom reported in the literature.

9. The relationship between costs and revenue can be computed for an academic unit, but the implications of this information for decision making are not clear.

10. Financial analysis is surrounded by many warnings about its limitations and potential misuses in relation to assessing program quality or effectiveness.

The findings show the need for futher work on the technical aspects of financial analysis and for discussion of questions about the role of this type of analysis for academic units. The measurement and allocation of indirect costs, the identification of revenue, and the analysis of fixed and variable costs need refining and testing to increase their validity and reliability in financial analysis. Questions about the issues to which financial analysis is applied, who uses this type of information, and how it influences their decisions need additional study. Critical questions about the use of cost-revenue data and their relationship to program quality or effectiveness need considerable investigation and discussion.

The state of the art is at a level where a number of concepts and tools of financial analysis should prove useful to administrators and faculty concerned with academic units in institutions of higher education. All participants involved in decision making affecting academic units should acquire knowledge of the potential and the limitations of the techniques of financial analysis.

To assess the financial dimension of an academic unit, its full cost (direct and indirect) should be measured. Accounting principles should be observed to ensure the completeness and accuracy of financial data, and patterns in the data should be examined for their fixed and variable characteristics.

The broad implications of identifying and allocating revenue to academic units should be explored before implementing this procedure. All parties concerned should understand how revenue information is to be used in decision making.

Unit-cost measures, such as cost per student, should be weighted to reflect the level of study and other factors that produce legitimate differences in cost. Expected cost per unit or per full-time equivalent faculty should be estimated by including data about average faculty support and workload in the analysis.

Financial analysis should be considered as one view of an academic unit. Analyses of other dimensions of a unit are essential to provide as broad a perspective as possible for enlightened decision making. Financial measures may yield important information, but the use of the information still requires discretion and wisdom.

The State of the Art

This review of the status of financial analysis for academic units in colleges and universities is based primarily on ERIC documents and articles published or written during the 1970s This literature describes how institutions address the topic and applications to particular institutions. The results of the review are organized into six areas: accounting for costs, accounting for revenue, analyzing costs, projecting revenues and expenditures, relating revenue to cost, and comparing fiscal efficiency to program effectiveness.

Accounting for Costs

This monograph focuses on the direct and indirect, fixed and variable dollar costs of operating an academic unit for a period of one year or less (a quarter or a semester, for example). It also examines the standards for recognizing what a "cost" is.

Direct and indirect costs. Determining the cost of operating a program, department, or college is somewhat difficult. An institution's accounting system may not have been established with this objective in mind. The level of detail in the chart of accounts, for example, determines which, if any, expenditures can be associated with a specific unit within an institution. Cost accounting systems tend to be unique to the individual institution. Although guidelines are available, no one system is accepted universally.

Those expenditures most readily identified as incurred for the operation of a specific unit are known an "direct costs." Expenditures incurred for several different programs or units that cannot be readily or accurately identified with the unit in question are termed "indirect costs." These expenditures, made by one unit within the institution on behalf of other units, are considered indirect costs to a unit benefiting from them. For example, the maintenance department may be responsible for cleaning a building used jointly by a number of units. A portion of the cleaning expense is an indirect cost to each unit benefiting from the service.

A given expenditure may be direct or indirect; the decision is often subjective and depends on the perspective from which the cost is analyzed, how much precision is required in the results, and how much effort and expense are needed to achieve that precision. The expenditure for cleaning in the previous example is a direct cost of the maintenance department but an indirect cost to an academic unit that benefits from the service.

The direct cost associated with a unit is often represented by its budgeted expenditures. If the unit has an identifiable, discrete budget, the expenditure accounts listed in the budget constitute the basis for determining the unit's direct cost. All other expenditures incurred on behalf of the unit would constitute its indirect cost. Although practice and accounting principles offer guidelines for determining what expenditures are identifiable as direct costs for a unit, institutional policy is the final determiner. For example, faculty salaries might be budgeted for a college without being assigned to a department. In this case, the departmental budget might contain accounts only for supplies and equipment. (This particular practice, however, is more characteristic of budgeting for a high school than for a college.)

Typically, the direct cost of an academic unit includes the following expenditures:

- salaries and benefits of personnel assigned to the unit
- supplies and equipment for the exclusive use of the unit
- telephone charges for instruments assigned to the unit
- postage for the unit's outgoing mail
- travel expenses of personnel assigned to the unit
- duplicating/copying services provided to the unit
- special jobs done for the unit by other units

Indirect costs include the following typical expenditures:

- salaries and benefits of personnel who provide service to the unit but who are not assigned to it regularly
- supplies and equipment shared among units
- utilities
- other expenses of units that supply support services

Keene and Strenglein (1973) reported the results of a cost analysis based on supplies and expense only. When calculated per full-time equivalent student (FTE-student), comparative cost data for supplies and equipment may be produced by department, school, or major academic area. Based on the average expenditure per FTE-student, the higher rates of expenditure occurred for engineering, fine arts, and natural sciences. Rates below the average occurred for education, business administration, general studies, and social sciences. The rate for engineering was nearly 5.5 times greater than that for social sciences; the nature of these two areas, of course, explains the difference.

Costs for graduate degree programs must reflect graduate student appointment costs as well as direct departmental costs and institutional support costs. Research costs may be approximated as the sum of unrestricted fund expenditures for departmental research and restricted fund expenditures for sponsored research (McCarthy and Garrison 1974).

An assumption of this review of the literature is that all institutional costs ultimately affect an institution's academic units. Consequently, the assignment of indirect costs to academic units requires major decisions about the principles and procedures to accomplish this purpose. The federal government's authorizing the funding of indirect costs in federally sponsored programs encouraged institutions to identify and allocate indirect costs. More importantly, institutional planners and administrators have come to recognize the need to consider indirect costs in budgeting and evaluating academic programs. This practice recognizes the accounting standard of "full disclosure" in that, to the extent possible, all costs of an academic unit are identified.

Once the principle of recognizing and assigning indirect costs to an academic unit or program is accepted, the task of finding meaningful ways

to allocate them is the next procedure. The best allocation is one that distributes indirect costs to each academic unit in proportion to the services received. Both accuracy and the cost of collecting data are the principal considerations in selecting a method of allocation. The common methods used are those based on: (1) student credit hours, (2) FTE-students, (3) number of students (headcount), (4) FTE-faculty, (5) square footage of assigned space, (6) time consumption, or (7) actual use. (For additional suggestions, see U.S. Dept. HEW 1973, pp. 82–83.) Although indirect costs can be allocated on the same proportion as the proportion of an academic unit's direct cost to the institution's total direct costs, this method masks the uniqueness of a unit's different needs for support services (Pettit 1978).

The search of the literature revealed no normative survey of the frequency with which the various methods of allocating indirect costs are used. In the practices reported, however, student credit hour (SCH) is mentioned frequently (Pettit 1978). SCH is a measure that represents the volume of activity in an academic unit. One SCH equals one student registered for one hour of credit for one semester. For institutions that use quarter-hours one-quarter SCH may be equated to 0.67 semester SCH (McCarthy and Garrison 1974). The sum of 15 SCHs, for example, may be produced in a number of ways:

one student registered for 15 hours of credit
fifteen students each registered for one hour of credit
five students each registered for three hours of credit
a multitude of various combinations of students and credits.

The assumption underlying the use of SCHs to allocate indirect costs is that equal sums of SCHs require the same quantity of support services without regard to differences in the combination of students and credits producing the sums. Distinctions between full-time and part-time students are not material to the calculation of this measure. Additionally, as a rule, an SCH credited to an academic unit is produced by a student registering for a course offered by *that* unit, irrespective of the student's home unit.

The class list for a section of a course is the customary source for determining SCHs. When courses are identified by sponsoring department, the SCHs produced by the students on that list may be credited readily to the sponsoring department without regard to the classification of the student or the program in which the student is enrolled.

Because the SCH is defined easily, it has tended to replace the concept of FTE-students in allocating indirect costs. The computation of FTE-students is a function of what constitutes a regular load of coursework that is generally some agreed upon number of credit hours. By using SCH, the need to define FTE-students is avoided.

The allocation of library expenditures to academic units illustrates various ways SCH may be used. In the following two examples, the level or classification of the academic unit's SCHs is weighted:

Example 1. Library expenditures are allocated to an academic unit according to its proportion of the institution's total (a) undergraduate SCH,

plus (b) graduate SCH in the natural sciences, mathematics, or accounting, plus (c) all other graduate SCH multiplied by 2 (Pettit 1978).

Example 2. Library expenditures are allocated to an academic unit according to its proportion of the institution's total (a) undergraduate SCH, plus (b) master's degree or special professional SCH times 2, plus (c) law degree SCH times 5.3, plus (d) doctoral degree SCH times 8.6. (These weights are suggested by the appropriations formula in Steen et al. 1979).

The following two examples illustrate the allocation of library expenditures on a different basis:

Example 3. Library expenditures are first allocated on the basis of enrollment in the respective programs. A weighting factor for each program is then calculated to reflect the relative expenditures on each program, using all expenditures except library expenditures. For example, if 8 times more were distributed to a doctoral program than to undergraduate programs, then 8 times as much library expenditures would be distributed to the doctoral program (McMaster University 1973).

Example 4. A department's weighted number of students is found by applying the following factors: (a) each freshman and sophomore is treated as 1 student, (b) each junior and senior is counted as 2 weighted students, and (c) each graduate and professional student is counted as 4 weighted students. The department's total weighted students is divided by the total weighted students in the institution. This ratio multiplied by the total allowable library costs produces the department's allocation (McCarthy and Garrison 1974).

Financial aid to students is another cost handled in different ways. Aid applied toward student fees represents income as well as an expenditure. In this case, the aid overstates both income and expenditure (Netzer et al. 1972). Student aid assigned by the dean or financial aid for athletics may be treated as indirect cost to all academic units and distributed on the basis of SCH (Pettit 1978). Graduate fellowships and traineeships are costs assignable directly to a graduate program, but teaching assistantships should be treated as costs to an undergraduate program. Research assistants funded from unrestricted research accounts are chargeable to a graduate program, but those assistants funded by sponsored research should be charged to the grant (McCarthy and Garrison 1974).

FTE-faculty is an appropriate basis for allocating general institutional costs and general administrative costs. The unit's percentage of total FTE-faculty would determine its share of those costs. The allocation may be distributed further to levels based on ratios of SCHs (McCarthy and Garrison 1974).

Expenditures for plant operations and maintenance are usually assigned as indirect costs to academic units on the basis of the net assignable square feet of space that they use (McMaster University 1973). Some institutions appropriate funds directly to colleges or departments, which they use to purchase physical plant services. The charge for service is based on actual costs and may include an amount for amortization and insurance (Zachar 1978). This permits those charges to be treated as direct costs to the unit.

A novel feature of this method of allocating indirect costs is the possibility of charging academic units for classroom space at different rates that reflect the desirability of the teaching hour Classes taught during popular hours would be charged a higher rate than that for unpopular hours, creating an incentive to schedule classes when the building is little used.

Under the concept of separate cost centers, the college or department may purchase plant services in a "free market" inside or outside the institution. Typically, the institution's maintenance department assumes the characteristics of a company store with the academic units as its clients. Ideally, this system clarifies the relationship of the physical plant to the academic units and clarifies the costs of its services. The plant department is "seen as responsive and responsible to the academic mission instead of to the buildings" (Zachar 1978, p. 21).

Several problems may emerge with the use of the space costing model:

1. Maintenance may become uneven across the institution.
2. Academic managers may redirect resources appropriated for operations and maintenance to people and programs.
3. Academic units may need to employ their own plant managers to oversee the system.
4. Start-up costs may be high.
5. Academicians may not see the value of being responsible for the plant (Zachar 1978, p. 18).

Once the treatment of indirect costs and how they should be allocated are determined, the next requirement is to decide whether costs should be allocated to academic units in a one-step, two-step, or multi-step process. In the one-step process, costs are distributed directly to academic units from support services. The contribution of one support service to another support service is not reflected in this method. For example, although the central administration and maintenance departments provide some service to each other, their full cost is allocated directly to academic units as the ultimate distribution point for all costs. Information about the "full" direct and indirect costs of a support service is not provided at any point.

The two-step process provides a way to recognize that some support units serve other support units as well as academic units. In the first step, costs are allocated to both academic and other support units. At the end of step one, therefore, some costs remain with support services. In the second step, these remaining costs are allocated directly to the academic units.

The multi-step process extends the two-step approach by continuing the allocation among academic and support units until the amounts in the support units are reduced to zero. Simultaneous equations are used to accomplish this iterative process. Although the multi-step process is considered to be the most accurate method of distributing indirect costs, it is the most complex, and the simplicity and low cost of the one-step process make it popular despite the inaccuracies introduced by its failure to treat the interrelationships among support services.

In one modified two-step plan, cost resides ultimately in programs. All

departmental costs are assigned to activity cost centers (instruction and supervision, professional activities and public service, research, administration, library services, student-related services, ancillary services, and operations and maintenance), which are then synthesized into program expenditures. The operating expenditures for support departments, such as the computer center, registration, and planning, are accumulated in the appropriate activity cost centers before distribution to related support activities and academic departments (McMaster University 1973).

The model proposed by Braun and Jordan (1973) is useful to summarize the discussion of direct and indirect costs. The model proposes a "full-cost" estimate of instructional outputs for departments, producing cost per SCH by course and supervisory costs for advanced students. The "cost-center" concept is used to accumulate expenditures and charges related to institutional, academic, and student support services. All charges are channeled finally to the appropriate academic departments.

Braun and Jordan use the following methods to allocate indirect costs:

1. General administration (institutional). The percentage that total general administrative cost is of the institution's total expenditures for current expense is multiplied by the total expenditures for a department's salaries, wages, and current expenses.
2. Physical plant and capital equipment (including depreciation and debt service). The total cost for these items is apportioned according to a department's net assignable square feet as a fraction of the institution's total net assignable square feet.
3. Plant operations and maintenance. The department's net assignable square feet is used to identify its share of costs for operations and maintenance.
4. College administration. Expenses of general administration for the institution are allocated to departments on the basis of their faculty headcount.
5. Graduate school office. The number of graduate students (headcount) in a department determines its share of the graduate school's expenses.
6. Research administration. A research center's percentage of total sponsored research dollars is multiplied by the institution's expenses for research administration.
7. Computer center. Reports of usage provide the basis for the allocation.
8. Libraries. A combination of headcount and SCH is used. To determine a department's undergraduate headcount, its percentage of total undergraduate SCH is multiplied by the institution's total undergraduate headcount. For graduate students, the headcount of students in master's degree programs is multiplied by 3 and the headcount of doctoral students by 5. The total number of weighted students is then used to apportion the expenses of the libraries.
9. Student services. These expenses are allocated on the basis of student headcount.

In step one, the institutional costs of general administration, physical plant and capital equipment, and operations and maintenance are allocated to academic and student services (numbers 4–9 above) as well as to the academic departments. In step two, the costs accumulated in the academic and student services are allocated to the academic departments. At this point, all the costs identified in numbers 1–9 above are assigned to the academic departments.

A department's direct and indirect costs are next analyzed and distributed according to instruction, research, and public service. Those costs not readily identified with a specific functional area are aggregated and apportioned among the three areas on the basis of faculty effort. (Faculty effort is self-assessed.) McCarthy and Garrison (1974) warn about apportioning sponsored research costs arbitrarily between the graduate and research programs of a department. They argue that such procedures would not reflect the total costs of providing or replicating either the quality of the department's research program or the research experience gained by students in its instructional programs.

Instructional expenses are analyzed further in an additional step, but research and public service expenses are not. Instructional expenses are categorized into one or more of seven levels and types of instruction: (1) lower-division undergraduate, (2) upper-division undergraduate, (3) graduate, (4) professional, (5) master's student supervision, (6) doctoral student supervision, and (7) professional student supervision. The costs in the first four areas are reported in terms of expenditure per SCH by level. Expenditures per student are reported for the latter three areas (Braun and Jordan 1973).

Fixed and variable costs. The measurement of direct and indirect costs is intended to provide an estimate of the full cost of operating an academic unit. This cost may then be analyzed further in terms of its variability, i.e., the extent to which increases or decreases in level of activity affect cost. "Fixed costs" are relatively insensitive to fluctuations; "variable costs," on the other hand, are affected directly by changes in the level of activity.

A good example of a fixed cost is the expenditure for debt service in relation to the number of students enrolled or to the number of SCH. The amount required to pay interest and to retire principal on the debt acquired to build classrooms is independent of the actual number of people using the space. Indeed, the debt may outlive the use of the building itself.

Many of the costs of offering a class are relatively fixed. Expenditures for the instructor's salary and benefits, heat, light, cleaning, insurance, and debt service are typical costs having little or no relationship to the number of students in a class. The cost for consumable supplies, in contrast, varies directly with the number of students.

The level of student served also influences the degree of variability in instructional costs. As a department or unit increases its number of doctoral students with concomitant increases in faculty time for research, departmental unit costs increase in most cases. Overall, however, increases in the

number of graduate students enrolled in a department produce small decreases in unit costs (McCarthy and Garrison 1974).

To an academic unit, some costs may be fixed within certain levels but may be variable between levels—a stairstep effect. The number of faculty, for instance, follows this pattern in relationship to the number of students. The "step" whereby the number of students affects faculty, however, is shorter than the one that relates students to clerical personnel; that is, a smaller change in the number of students is required to produce a change in the number of faculty than in the number of clerical personnel.

Although stating that a unit's budget should be related to its student load, Dunworth and Cook (1976) argue that a fixed element of cost must be recognized. If a program is to be offered at all—even to one student—faculty would be required to teach the subject and space would be needed. If a course or program requires a laboratory, certain equipment would be necessary regardless of the number of students. For some specified minimal enrollment, this cost is best treated as a fixed cost. As student load increases above a certain point, the incremental cost may be treated as a variable cost.

To determine a student load factor for variable costs, three characteristics of the unit's programs and courses should be considered. First, the load factor would vary between subject areas. Second, undergraduate and graduate students should be weighted differently. Third, the factor should allow for service teaching to students in other disciplines and for the loss of load for a unit's own students who are taught by other faculty (Dunworth and Cook 1976).

In the analysis of a unit's financial operations, the approximate impact that changes in enrollment have on cost must be determined. Likewise, as the number of faculty positions in a unit changes, it is reasonable to expect certain costs to change predictabiy. The average cost per faculty position for supplies, materials, telephone, travel, etc., may be used as the cost factor for a change in the number of faculty. In this way, the cost for an academic unit may be analyzed in terms of student flow and faculty mix (Kieft 1975).

In times of increasing enrollment, the emphasis is likely to be on variable costs—how to project and meet them. When enrollment is declining, once variable costs have been reduced, pressure is then brought to reduce fixed costs (or to go back down the stairsteps). In this situation, the hard decisions about personnel and space—retrenchment and building closures—must be made. To assess the financial status of a unit, therefore, knowledge of its fixed and variable costs should prove useful.

Standards for recognizing a "cost." Information about costs is accumulated in accounting records and summarized periodically in financial reports. For these reports to be useful, the reader must be aware of the principles used in recording the information. A number of accounting concepts influence the ability of a financial report to tell the full story. One of them is the concept of "realization": When does a financial event occur so that it is recognized in the accounts and ultimately in the reports?

In cash basis accounting, financial events involving either the receipt or

disbursement of cash are the only events recognized in the accounts. Expenditure accounts would show only those entries for which cash had been disbursed; revenue accounts would report only the receipt of cash. Neither outstanding liabilities and commitments nor accounts receivable would be reflected. Cash basis accounting, therefore, often gives an incomplete picture of cost. Seldom are all financial activities of a unit at the point where cash payments would coincide with the charges against its accounts. When the financial books are "closed" at the end of a fiscal period is the most likely time for the difference between cash disbursements and actual expenditures to be minimized.

Accrual accounting permits liabilities to be recognized before payments are made and revenue to be recognized before cash is received. This method recognizes financial events when an obligation to a second party is incurred or when a claim against a second party is established. At these times, the event is recorded and reflected in financial reports. Some time, weeks or months, may pass before the event produces a change in the cash account.

For monitoring expenditure accounts, encumbran accounting extends the accrual method an additional step. As noted p iously, in accrual accounting, an expenditure account would be charged when a liability exists and recorded when a vendor has submitted an invoice, which represents a legitimate claim for the value of goods or services delivered and accepted. During the time between the placing of the order and the recognition of the liability, the accounts would not reflect the commitment to purchase. The encumbrance system fills this gap by including an entry in the expenditure account at the time the order is placed or the contract is signed; no liability yet exists, but the intent to commit funds for ultimate disbursement to a specific second party is recognized.

In the accrual and encumbrance methods, the time at which the financial event is recognized and recorded is crucial to the completeness of the accounting record and financial report. The delay of just a day or two can change the picture shown by the books. This problem is critical at the end of the fiscal period. If for some reason the recording of an event is deferred to the next year, the report will not reveal the fact that information has been tabled (Walters 1979). The evaluation of expenditures reported for an academic unit therefore requires knowledge about how costs were determined and recorded.

The following standards are useful for determining costs:

- Information on costs should be based on the accrual method of accounting.
- Cost data should be reconcilable to official financial accounting data.
- Uniform definitions should be used in determining costs.
- Cost information and related costing service units should cover the same time period.
- Information on costs should be consistently determined from period to period and from organizational unit to organizational unit.
- Indirect costs should be allocated in a practical manner.

- Capital cost of a cost objective should reflect tha applicable expired (i.e., depreciated) cost of the period.
- Information on costs should be accompanied by a disclosure statement (National Association of College and University Business Officers 1975).

In addition to these standards, public institutions may find useful the following standards cited by Miller (1980):

1. *Accounting and reporting capabilities.* A governmental accounting system must be capable of producing reports that conform with generally accepted accounting principles and with legal requirements if the two are significantly different.
2. *Fund accounting systems.* A governmental accounting system must be organized on the basis of funds.
3. *Types of funds.* Only eight types of funds should be used (listed and defined in this principle).
4. *Number of funds.* A governmental unit should establish and maintain the least number of funds possible.
5. *Accounting for fixed assets and long-term liabilities.* Fixed assets and long-term liabilities not related to a specific fund should be accounted for in "General Fixed Assets" and "General Long-Term Debt," respectively.
6. *Valuation of fixed assets.* With certain minor exceptions, fixed assets should be recorded at cost or estimated cost.
7. *Depreciation of fixed assets.* Depreciation should be recorded only in specified types of funds.
8. *Accrual basis in governmental accounting.* Accrual accounting should be used in certain specified types of funds, modified accrual accounting in others.
9. *Budgeting, budgetary control, and budgetary reporting.* Every governmental unit should adopt annual operating budgets, and certain of those budgets should be reported in the financial statements.
10. *Transfer, revenue, expenditure, and expense account classifications.* A governmental accounting system should provide for the classification of revenues, expenditures, and expenses into certain specified categories.
11. *Common terminology and classifications.* A governmental accounting system should consistently use terminology and classifications common to the funds maintained.
12. *Interim and annual financial reports.* Every governmental unit should issue interim financial reports and annual financial reports.

Accounting for Revenue

The financial analysis of academic units within institutions of higher education is directed primarily to expenditures and cost. The literature pays scant attention to the revenue side of the ledger. Perhaps there is an inherent reluctance to describe academic units in terms of revenue production, for,

as is practiced in most accounting systems in place, specific information about an academic unit's revenues is simply not recorded. Other than identifying revenue by source such as tuition, fees, state aid, gifts, endowments, grants, and contracts—all of which describe an external source—revenue is rarely ascribed to the efforts of specific internal units.

Revenue identified most closely with internal units is that from the units' contracts. In these cases, the accounting system is set up to show the recipient of the grant or contract so that the expenditures can be controlled properly. In like manner, revenue associated with auxiliary activities, e.g., bookstores, residence halls, and intercollegiate athletics, is recorded directly in the accounts of the respective activity.

Those activities/units for which special revenue has been received or for which a price is charged for goods or services are the areas where the most detailed revenue records have been kept. Whenever attention is focused on accounting for a specific sum of money or when the "profit or loss" of an activity is a criterion of effectiveness, accounts are organized to trace revenue as well as expenditures to a unit. Proprietary funds—enterprise and internal service funds—and special revenue funds illustrate accounting procedures for recording revenues and expenditures at the subunit level within an educational institution.

For the most part, budgets for academic units have represented plans for expenditures only. The notion of a revenue plan as well has not been a welcomed addition to the budget. Academic administrators, accustomed to receiving their operating funds from the general revenue of the institution, are not likely to view their units as "revenue generating" nor to believe they should be responsible for producing the revenue required to fund their expenditures.

The cost-center concept, originally developed in industry to determine the full cost of a unit, stimulated interest in assigning revenue as well as allocating cost. In one model, tuition, fees, designated endowment income, gifts, and overhead recovered from sponsored programs associated with a school rather than an individual academic unit are isolated for each school and are distributed to academic units according to the SCHs they produce during the academic year. Actual revenue figures are credited to a unit for recovering overhead based on its actual sponsored programs and for its actual summer session income (Pettit 1978).

With a uniform tuition rate per SCH, the distribution of tuition on the basis of SCH may be mathematically accurate. When tuition rates vary—e.g., in-state versus out-of-state residents, part-time versus full-time students, undergraduate versus graduate students—the distributed amounts will contain some errors if SCHs are not weighted. No report reviewed for this monograph describes the distribution of tuition on an actual basis to the respective units.

An accounting system that permits only a small portion of revenue to be assigned to units on an actual basis is open to considerable criticism. Beyond this technical problem, however, lie the controversial issues of an academic unit's responsibility for generating income and the inevitable matching of

revenue and expenditures in a "profit or loss" statement. For a college to fulfill the objective of educating the "whole student," it is likely that some of its components may never yield a dollar profit.

Analyzing Costs

Once the cost of an academic unit is measured, a method to assist in interpreting that sum is often needed. Costs can be analyzed in terms of student-based indices, faculty-based indices, or a combination of these indices.

Student-based indices. The cost of an academic unit may be interpreted in terms of the volume of its activity. One indicator of the volume of acitivity is the number of students served. Thus, SCH and FTE-student are two measures used to represent volume of activity. Once a unit's cost and student volume are determined, the calculation of cost per student is simple. For an academic unit:

1. $\frac{\text{Total cost}}{\text{Total SCHs}} = \text{Cost per SCH}$

2. $\frac{\text{Total Cost}}{\text{Total FTE-students}} = \text{Cost per FTE-student}$

In interpreting these ratios, the user must note whether "total cost" represents actual cost (direct and indirect), anticipated actual cost (usually an amount representing estimated cost for a budget period that has not yet closed or for which actual cost data are not yet available), or budgeted cost. Likewise, the user should be informed of the basis for total SCH or FTE-students. In one system, for example, the calculation of FTE-students is based on the enrollment as of the tenth day of the term or on a net basis at the end of the term. Annualized FTE-students may be computed by adding the SCHs for each of the four quarters (in a quarter system) and dividing by a factor of 45 (Meier and Story 1979).

Cost ratios may be compared across time (horizontal analysis) for a given academic unit or within a specific year among the several academic units in the institution (Walters 1979). In horizontal analysis, changes in total cost may be compared to changes in cost per SCH to provide an indication of "productivity" (Garber and Paradiso 1976). Changes in cost per SCH may be produced in various ways:

1. Total cost may change while total SCHs remain constant.
2. Total SCHs may change while total cost remains constant.
3. Both total cost and total SCHs may change in the same direction but at different rates.
4. Both total cost and total SCHs may change in opposite directions from one another.

These ratios do not identity reasons for these changes. They serve merely to indicate that change has occurred.

Index numbers may prove helpful in assessing the magnitude of changes in cost per SCH. Index numbers are computed by selecting one year as a base year, designating its cost per SCH as 100, and converting the cost per SCH in each of the remaining years to a percentage of the base year's cost per SCH × 100 (Walters 1979). The use of index numbers is illustrated in Table 1.

Table 1: Horizontal Analysis of Cost per SCH Using Index Numbers

	Cost per SCH			*Index Number*		
Division	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Arts and Sciences	$33.08	$32.37	$32.60	100	98	99
Professional Studies	$38.71	$42.00	$43.30	100	108	112

Source: Garber and Paradiso (1976).

The index numbers in Table 1 readily show the reduced cost per SCH for arts and sciences and the increased cost per SCH for professional studies This difference in the pattern of cost per SCH suggests the need for further investigation. Administrators might want to answer several questions:

Is the Division of Arts and Sciences
a. maintaining the scope of its program,
b. maintaining the quality of its program,
c. being assigned a lower priority for resources per SCH, or
d. being neglected?

Is the Division of Professional Studies:
a. encountering a decline in SCHs,
b. experiencing start-up costs for new programs,
c. being assigned a higher priority for resources per SCH, or
d. being mismanaged?

Although student-based indices are reported frequently in the literature, the user of such indices should exercise caution in analyzing the relationship between total cost and total students. Evidence suggests that the relationship is not linear. In a study of 500 undergraduate students in the field of technology, Legg (1973) found that the cost per student differed according

to the number of departments involved. Fifty students per department in 10 departments produced a cost nearly 1.28 times greater than 100 students per department in 5 departments or 1.57 times greater than all 500 students in a single department. Legg concluded that "considerable diseconomies can occur at the small department population" (p. 433). As an extension of his analysis based on data from 1968–69, Legg reported that "an appropriate economic overall... university size... for the U.S.A. ... would be 10,000" (p. 438).

At the graduate level, the meaningfulness of cost per SCH is questionable. The acceptance of SCH as an adequate proxy for the volume of activity within graduate programs is a key issue. In their study of different methods for estimating departmental costs, McCarthy and Garrison (1974) report that the method that uses cost per SCH

> *does not recognize the significantly greater faculty time which is usually associated with instruction and research at the advanced levels. In our view and that of the Advisory Committee, the CREDUCT procedure [the method based on SCH] does not merit serious consideration as a potentially useful procedure for making estimates of the costs of graduate work (p. 17).*

Because of the scope of the study by McCarthy and Garrison, it is summarized later in this monograph.

Faculty-based indices. The primary direct cost of an academic unit is for personnel. The cost of an academic unit might therefore be analyzed in terms of its cost per faculty member (FTE-faculty or headcount). As noted previously, the cost of an academic unit reacts more directly to changes in its level of staffing than to changes in the number of students served.

One model described by Robbins (1978) offers a method of analyzing a unit's cost in comparison to its workload and the needed faculty support at standard rates. According to this model, the sum of money calculated as a unit's allowable cost does not include sums that might be authorized on an individual basis; instead this sum might be viewed as an expected cost based on the total sum of money in the institution available for its basic operating needs. The model describes a means for allocating financial resources to academic units. Substituting cost data for the "total adjusted amount to be allocated" (pp. 4-6) allows the model to be used to compute a unit's expected cost rather than its allocation. The expected cost can then be compared to the unit's actual cost as a reference point for making judgments about the actual cost. Cost per faculty can be analyzed by dividing the unit's expected cost by its FTE-faculty.

The expected cost for a unit is calculated as follows

$$\frac{(T)(F_1)(W_1)}{D} = \text{Expected cost of Unit 1}$$

where T = total adjusted cost in dollars to be assigned in the institution,
where F = average faculty support at standard dollar amounts (F_1 = the quantity for academic unit 1),
where W = estimated workload units (W_1 = the workload units for academic unit 1), and
where D = the sum of the products of average faculty support (F) and estimated workload units (W) for all academic units in the institution

Average faculty support (F) is found by multiplying the number of FTE-faculty by rank times the standard rate of support by rank, summing these products, and dividing by the unit's total FTE-faculty. The standard rate may be the average salary by rank in the college or university at large. Another option is to use regional data, taking into account differences in salaries for different disciplines. The standard rate may also include each person's share of other expenses. The computation for an academic unit having 1.75 FTE professors, 3 FTE associate professors, and 1 FTE assistant professor is illustrated in Table 2.

Table 2: Computation of Average Faculty Support for an Academic Unit

FTE-Faculty by Rank		Average Salary[a]	Secretarial Expense[b]	Supplies Expense[c]	Travel Expense[d]	
Professors	1.75	(25,000 +	1,391.30 +	406.52 +	1,000) =	$ 48,646.18
Associate Professors	3.00	(20,000 +	1,391.30 +	406.52 +	750) =	67,643.46
Assistant Professors	1.00	(15,000 +	1,391.30 +	406.52 +	750) =	17,547.82
Total	5.75					$133,837.46
		Average Faculty Support				$ 23,276.00

[a] Average salary by rank in the college or university.
[b] Equal share of one secretary's salary of $8,000.
[c] Equal share of supplies expense of $2,337.50.
[d] Travel expense allotments.
Source: Robbins 1978, p. 11

Workload units are computed for each faculty member on a form having 23 categories for listing ways in which workload units can be credited. These categories are divided into the four areas of teaching, research, public service, and administration. Teaching units represent scheduled classroom instruction, scheduled laboratory instruction, scheduled individual instruc-

tion, and student advising. A system of weights is used to differentiate such factors as the level of course, number of students in a class, and type of class. For example, an undergraduate class of 30 students for 3 course credit hours produces 3 (3 × 1.00) work units. If this class were a graduate course, it would produce 5.25 (3 × 1.75) work units. (See Robbins 1978 for a complete illustration of the workload form and weights.) The number of workload units for the academic unit itself is found by summing the results for its faculty members.

The accuracy of this model hinges on the accuracy of the data used to compute average faculty support and workload units. Of these variables, the measurement of workload units is likely to be the more difficult. Agreement on what should be counted and the weights to be used may be difficult to achieve: The work of the professor has not lent itself to easy quantification. Beyond this problem is that of data collection. Ordinarily, professors have not punched clocks or kept time logs.

Combination indices. Costs can be analyzed by using both student- and faculty-based indices and by considering a number of other bases. Pettit (1978) describes a program model for analyzing costs in which departmental cost figures are broken down by courses offered and then by program. This model requires data about which programs students are pursuing and a detailed faculty activity report.

A second model uses a three-phase plan to analyze costs by program and per student. Phase I includes the identification of activities and the determination of the extent to which departments participate in each. Phase II comprises the accumulation of expenditures by department and support activity. Finally, in phase III, expenditures for departments and support activities are assigned to programs and then used to compute program cost per student. Costs for research, professional activities, and public service are reported by department only. The data developed by this analysis, however, "should be viewed as having order of magnitude validity, not dollar and cent precision" (McMaster University 1973, p. 3).

Listou (1976) proposes five levels at which costs could be analyzed: instructor, course, discipline, division or college, and curriculum or program. The total cost for each instructor is computed and then converted to cost per SCH for that instructor. An analysis of costs by course produces the total cost, the average cost per student, and average cost per SCH for each course. Discipline is analyzed by total cost and by average cost per SCH. Division or college costs are analyzed by instructional costs, division indirect costs, and average division indirect cost per SCH. An analysis of curriculum or program costs results in cost per student.

Although the analysis may cover the costs for a full year, it can be applied to a semester or shorter period. This system is designed to operate independently of the institution's existing accounting systems, policies, and responsibilities.

Costs of graduate programs. The previously cited work by McCarthy and

Garrison (1974) is an extensive research report that presents the results of testing three procedures for estimating costs of graduate degree programs. The study was conducted with data from 14 colleges and universities in the United States but was limited to programs in biochemistry, cell biology, chemistry, economics, English, mathematics, and psychology. Average, upper quartile, and lower quartile program costs per enrolled graduate student and per graduate degree awarded were estimated.

The three basic procedures tested were labeled CLASSCUT, CREDCUT, and COMPCUT. Although the expression "total department budget expenditures" was used, the term incorporates the concept of actual costs, including direct and indirect costs. The report also illustrates several techniques for assigning indirect costs.

The CLASSCUT procedure is

> *based on two propositions: that the cost of faculty time used for preparation and presentation of instruction to a class is about the same for every class, and that each class can be assigned to a particular instructional program, depending upon identification of its main clientele or proportion of major enrolled Doctor, Master, or Bachelor students (p. 13).*

Three computations are made: The first produces the cost per class, the second cost per program, and the third cost per student.

1. $\frac{\text{Annual department budget expenditures}}{\text{Annual number of department classes}}$ = Cost per class
2. (Cost per class) × (classes taken by enrollee in program) = Cost per program
3. $\frac{\text{Cost per program}}{\text{Number of enrollees}}$ = Cost per student

The CLASSCUT procedure has a number of difficulties: (1) classes could not always be allocated to a specific program; (2) faculty activity related to independent study and to the supervision of theses and dissertations was difficult to measure; (3) no distinction was made between beginning and advanced classes. In an attempt to compensate for the third difficulty, McCarthy and Garrison use an arbitrary weighting in favor of advanced classes. This modification of CLASSCUT was labeled CLADCUT.

The CREDCUT procedure produces outcomes similar to CLASSCUT except that SCH replaces the number of classes. The equations become:

1. $\frac{\text{Annual department budget expenditures}}{\text{Annual number of department SCH}}$ = Cost per SCH
2. (Cost per SCH) × (SCH taken by enrollee in program) = Cost per program

3. $\frac{\text{Cost per program}}{\text{Number of enrollees}}$ = Cost per student

McCarthy and Garrison favor CLASSCUT over CREDCUT. If classes are allocated to programs effectively, CLASSCUT is valuable because of its simplicity. They do not recommend CREDCUT for estimating the costs of graduate work because SCH has limitations in reflecting the activity of graduate faculty.

The COMPCUT procedure introduces the element of level as a refinement of the analysis. McCarthy and Garrison consider this procedure to be the most useful of those studied because the distribution of faculty time among levels and students' use of resources are taken into account. Instruction is classified according to five levels: (1) lower division undergraduate, (2) upper division undergraduate, (3) graduate classes, (4) independent study and master's thesis, and (5) dissertation. The distribution of faculty time among these levels is by an analysis of faculty activity. Student participation by program is identified through a crossover analysis of SCHs completed by students in the parent department and extradepartmental SCHs. The equations for COMPCUT are as follows:

1. "Annual department budget expenditures" are allocated to level based on the analysis of faculty = Cost per level

2. $\frac{\text{Cost per level}}{\text{SCH per level}}$ = Cost per SCH by level

3. (Cost per SCH by level) × (SCH in program) is summed for all levels in the program and allocated according to the student crossover analysis = Cost per program

4A. $\frac{\text{Cost per program}}{\text{Number of enrollees}}$ = Cost per student

4B. $\frac{\text{Cost per program}}{\text{Number of awarded degrees}}$ = Cost per degree

The crossover analysis in the third equation shows the "total SCH by specific academic field, and/or academic area, and by level, taken during a specific quarter or semester by all of the students enrolled in the subject program" (p. 21). Because more than 80% of the SCHs of the average graduate program were taken in the parent department, McCarthy and Garrison suggest that costs of SCHs for the parent department could be used to approximate costs of SCHs for all courses taken by its students. If a student crossover analysis is not available, an estimate of cost per awarded

degree can be based on information about SCHs for the courses a typical student would complete in a particular program.

In equation 4B, "number of awarded degrees" is based on the five-year average of degrees awarded in the program. Because the overall cost per awarded degree reflects the influence of several different factors, the researchers concluded that the total annual cost per enrollee is a much better way to express unit costs than is the total cost per awarded degree.

In determining the number of enrollees, the researchers used headcount in most cases. In their sample, part-time students composed only 10 to 20% of the total population. The average number of graduate students per FTE-faculty ranged from about two to four.

COMPCUT has several shortcomings:

1. The data from the analysis of faculty activity were frequently of limited reliability.
2. SCH data did not adequately reflect independent study and research for master's theses and doctoral dissertations.
3. The number of students reported to be enrolled in a graduate program was often imprecise.

On balance, however, McCarthy and Garrison find COMPCUT to be the "most useful procedure for estimating departmental cost" (p. 81).

Projecting Revenues and Expenditures

The financial report for an academic unit typically represents one year's operation. To place this report in perspective, historical data for previous years and projections for the future are needed: historical data to depict the actual experience of the unit and help reveal patterns in its past financial affairs and projections to show how the unit may be affected by future conditions.

On the assumption that the past is often a good predictor of the future, mathematical models for projecting student enrollment, expenditures, or revenue can be used. These models extrapolate the patterns or trends of the past and project their effects into the future. Trend line analysis, for example, is a correlational technique that compares the values of one variable to their corresponding time periods. The resulting prediction equation can be used to estimate a value for the first variable for any future period. Although projections can be made for any number of years, the trend in the historical data must be linear for the projections to be accurate.

A procedure designed specifically to project student enrollment is the cohort-survival technique. It is best suited to circumstances in which an institution draws its student population from a rather well defined geographical area. Furthermore, it is likely to be more accurate for projecting institutional enrollment than for projecting enrollment in specific academic units. Once students are admitted to a program, this technique can project rather accurately their continuation in it.

The basic assumption underlying the cohort-survival technique is that

past trends will continue into the future. During periods of rapid increases, the technique underestimates enrollment; during rapid declines, it overestimates the projections. An unusually high or low survival rate within the base period (ideally at least five years) may also produce misleading results. These problems, which are consequences of the averaging process used, must be considered in interpreting the projections (Walters 1981). The user must also be aware that the utility of a mathematical model depends on how well its assumptions match an institution's circumstances. A rapidly changing environment may render mathematical projections useless.

Once the actual or projected number of newly admitted students is available, an "induced course load matrix" can be constructed to project enrollment (Kieft 1975). The matrix requires information about the average number of credits taken by a program's student major in the several departments or disciplines. Program majors are listed along one axis of the matrix, departments or disciplines along the other. For some specified term in their program, botany majors, for example, might average 6.1 credits in biology, 4.3 credits in mathematics, 2.6 credits in history, and 3.0 credits in English. If 100 botany students were at this level in their program, the averages could be used to estimate the number of credits these students would generate for the respective departments: biology, 610; mathematics, 430; history, 260; English, 300. Thus, a second matrix, "the induced work load matrix," can be developed to show the total number of credits taken by the various majors in each discipline or department. These two matrices can be used to project enrollment, measure department workload, and compute program costs (Kieft, Armijo, and Bucklew 1978).

For planning expenditures, enrollment projections are useful in estimating the number of faculty required. The projected enrollment divided by the standard workload of students per FTE-faculty yields the number of needed FTE-faculty. To provide flexibility through the use of some part-time instructors, a production factor can be used to represent the maximum percentage of the total load to be covered by full-time personnel (Miner n.d.).

For planning revenues, enrollment projections are important for estimating revenue that is a function of the number of students served, e.g., state capitation grants and tuition. Matching projected expenditures to the revenue that would be produced by the projected number of students will reveal whether additional revenue will be needed and whether expenditures will need to be reduced.

Making horizontal projections or analyzing historical financial data is confounded by the nature of the dollar as a unit of measure. Inflation or deflation of the dollar differs from city to city and region to region. Projects must take these factors into account.

With projections of enrollment, expenditures, and revenue in hand, a financial plan can be developed that addresses a number of concerns:

- number and types of faculty needed
- methods for adding to, retaining, or reducing the number of personnel
- changes needed in the curriculum or organization for instruction

- plant facilities needed
- methods for adding to, modifying, or disposing of plant facilities
- quantity and types of support personnel needed
- changes necessitated in student services and athletics,
- methods for winning support for changes in operations resulting from changes in enrollment (Walters 1981).

Relating Revenue to Cost

What relationship should exist between the cost of operating an academic unit and the revenue associated with its activities? The business-oriented view argues that the relationship is a dependent one and that a unit should be responsible for providing revenue for meeting its costs. The "service-oriented" view counters that the two are independent, that to view an academic unit to be responsible directly for raising revenue is to subvert its raison d'etre. These polarized statements may oversimplify the situation, yet one view or the other underlies each financial analysis model in the literature.

"Every tub on its own bottom." "Every tub on its own bottom" characterizes the view that each unit should be self-sufficient, that it should be a separate cost center with its own income (Zachar 1978). In most applications of this concept, a school or college is the smallest unit so treated. Its logic, of course, can be extended to the level of program or department—and ultimately to individual course or faculty.

One application of this concept uses the term "balance of payments" to describe the difference between a unit's income and its expenses. If income is greater than expenses, the balance is described as a "contribution" to the institution. Conversely, if income is less than expenses, the balance is labeled a "drain" on the institution (Pettit 1978).

This philosophy illustrates economic survival of the fittest or free enterprise applied to academe. If an academic unit is unable to demonstrate sufficient economic worth to support its cost, should it survive? If an academic unit attracts revenue beyond its own costs, should it reap the benefits itself? A negative answer to the first question and a positive one to the second indicate that financial analysis of academic units must relate revenue to cost.

What role the relationship between costs and revenue has in decision making is reflected by an institution's priorities. The relationship may be the top priority in financially distressed institutions. In other institutions, it may be one priority among many others. As a criterion in the evaluation of a program, the "assessment of needed resources and costs is a complex judgmental process that is fraught with pitfalls" (Shirley and Volkwein 1978, p. 482).

A program or unit that generates an excess of revenue over costs may be rated "excellent" on its cost-revenue relationship. If a program is able to earn revenue approximately equal to its costs, it could be rated "adequate." A "poor" rating for the cost-revenue relationship would describe a unit whose costs exceed its income (Shirley and Volkwein 1978, p. 482).

"To each according to need." In analyses where revenues for academic units are not related to their expenditures or costs, attention is focused on that unit's use of resources and its priority in the institution. The priority of the unit can be assessed along two dimensions: (1) the current quality of its academic programs and (2) the centrality of these programs to the overall goals of the institution. The process of analyzing costs in an academic unit, then, should reflect its relative academic priority and relative financial need (Lawless et al. 1978).

"To each according to need" assigns concerns and responsibility for revenue matters to the institution, not the academic unit. The institution is expected somehow to generate the resources for supporting its academic programs. Programs compete with one another for these resources according to their quality and priority within the institution—the evaluation of which is much more subjective than is the mathematical comparison of revenue to cost.

Some objective criteria can be applied in evaluating financial need. The level of program and instructional method are factors to consider. Undergraduate programs are generally assigned fewer resources than graduate programs on the premise that they require fewer faculty, clerical staff, and support staff per student. Service units (academic units that teach students whose home unit is elsewhere) are expected to have higher student/faculty ratios than are discipline-based units. Likewise, academic units engaged primarily in lecture/discussion courses should be the least labor intensive and least costly in terms of expendable supplies and equipment. On the other hand, units that are highly research oriented are likely to be the most labor intensive and costly per student (Lawless et al. 1978).

The size of a unit is an additional objective factor that can be considered in measuring need. Nevertheless, some small units experience diseconomies of scale and therefore may be given preferential treatment in their funding (New Mexico 1978; Legg 1973).

Under the "need" system, academic units

> *naturally seek to maximise [sic] the resources they receive each year—why try to manage on less if more can be obtained? Furthermore, once granted a budget for a particular purpose, they will ensure it is spent, for to do otherwise would be to show that too much had been made available and would invite a reduction in next year's allocation (Dunworth and Cook 1976, p. 155).*

The norms for these objective criteria can also be disputed. Units may argue the necessity of changing the norms to enhance their respective entitlements. Moreover, resources allocated per student, for example, may appear fair, but the same pattern of resources for different departments is not necessarily efficient. If the efficiency of academic units is to be improved, incentives such as the ability to retain some of the savings produced and to decide how to spend those savings are needed (Dunworth and Cook 1976).

Factors such as student enrollment (majors and nonmajors), average class size, frequency of course offerings, type of course (laboratory, lecture, seminar, etc.), and faculty teaching load may be used to determine the minimum fiscal resources necessary to sustain a program. Academic planning, however, should be founded upon "an exact understanding of existing instructional and research program plans, rather than by methods which are limited in their predictive accuracy and do not provide a useful understanding of academic program breadth, e.g., student/faculty ratio approaches" (Jones 1978, p. 4).

Jones (1978) describes a critical mass planning model "to enable academic units . . . to justify resource acquisition and retention on a basis other than student enrollments" (p. 2). He argues that "faculty should teach curricula which they believe to be necessary in order to fulfill the missions of academic units and institutions, regardless of student demand" (p. 9). This notion stands clearly in opposition to financial analysis that emphasizes the matching of revenue and costs for academic units.

Comparing Fiscal Efficiency to Program Effectiveness

This monograph is limited to an investigation of techniques for the *financial* analysis of academic units. It is based on the premise that financial analysis is essential for evaluating past performance and for planning future activities of such units. This premise, however, does not proclaim financial analysis to be the only or the best way to conduct such evaluations or planning.

Financial analysis may carry more weight in decision making than is justified because of its quantitative characteristics. Its seeming objectivity and precision are accepted eagerly to rationalize decisions or to absolve the decision maker from the need to think or otherwise defend his or her decisions. The literature contains many warnings that evaluation or planning must not be limited to quantifiable considerations.

> *[M]uch that is worthwhile in higher education is not measurable and, indeed, may be depreciated by attempts at quantification. However, this does not mean that quantification can be ignored or that the effort to measure quality and effectiveness should be abandoned (Kieft, Armijo, and Bucklew 1978, p. 4).*

The transfer of the concept of productivity to academe from the business world brings two problems with it. The first problem is the tendency to appraise productivity only in terms of costs. Any reduction in cost is seen as an improvement in productivity; the consequences of the reduction of the institution's effectiveness are ignored. The second problem is the response by academics to treat productivity only in terms of outcomes. Any improvement in outcomes is deemed desirable regardless of cost. If "productivity" is to be a constructive term, it must be recognized as a relationship between costs and outcomes—between efficiency and effectiveness (Kieft, Armijo, and Bucklew 1978).

If the financing of higher education were only a minor problem, little interest in this topic would exist. But financial adversity struck both prestigious and little-known institutions during the 1970s. Prospects for the immediate future include the further curtailing of programs and the closing of institutions because of financial problems.

A study at Stanford University tested two hypotheses about the response of academic units to financial adversity:

> *1. Departmental efforts to increase the attractiveness of the curriculum will be greater in times of financial adversity than in times of prosperity. 2. Efforts to increase the attractiveness of the curriculum in time of adversity will be less in departments with strong research reputations than in departments with weaker reputations (Manns and March 1978, p. 543).*

The first hypothesis was tested with data on eight curriculum variables from 30 academic departments at Stanford University. The period of 1964–66 was selected as a time of prosperity, 1971–73 as a time of adversity. The findings supported the hypothesis, and the researchers concluded that

> *under conditions of relative adversity Stanford departments tended to increase variety in course offerings, provide more attractive packaging, make courses more accessible, and increase course benefits to a greater extent than the same departments did during conditions of relative financial plenty (Manns and March 1978, pp. 549–50).*

The second hypothesis was tested by ordering departments at Stanford University according to their mean national reputational rankings for 1966 and 1970. Again, the findings supported the hypothesis. "Departments with strong academic reputations were less likely to change than those with weaker reputations" (Manns and March 1978, p. 550). Almost no differences, however, were found among departments according to subject matter.

In situations more severe than that represented by Stanford University, many institutions have been confronted with the task of closing programs. Based on a sample of large public universities that have closed programs or have had some financial difficulties, six needs were identified:

1. the need for adequate financial analysis (closing a program may not save money; at best it may reduce future budget commitments)
2. the need to analyze marginal costs (consider the impact of closing program X and allocating the resources to program Y)
3. the need for timeliness (reviewing and arranging programs by priority is very time consuming)
4. the need for comparable data (a frame of reference is needed to avoid treating data in isolation)
5. the need for acceptable measures of research productivity (accepted standards are lacking)

6. the need for understanding the institution's mission (a clear definition of the institution's mission is vital) (Dougherty 1979).

Whatever the decision about an academic unit, the methods of financial analysis described in the literature offer ways to approximate the revenue and expenditures attributable to that unit. This information provides a basis for linking enrollment and revenue and for revealing relationships among academic expenditures, academic support costs, broad educational expense, and overhead (Pettit 1978). Careful consideration of cost data may help indicate problems and identify the status of important decision variables (Adams et al. 1978; also cited in Pettit 1978).

Financial analysis by itself does not improve decision making. It provides both a discipline and tools for administrators to use, but they will still have to consider other intangible factors. The financial analysis of academic units should not dictate academic staffing and allocation of resources nor reduce the scrutiny of noninstructional units and their performance. The nature of the general estimates produced by the analysis must be recognized. Above all else, financial analysis does not provide information about the quality of teaching, research, or service (Pettit 1978).

Although quality is conceded to be more important than quantity, it is more difficult to measure. The temptation to settle for an easy-to-gather statistic, which may be appropriate for one purpose but not another, must be avoided. Cost must not be confused with value, salesmanship with scholarship, efficiency with effectiveness.

> *Judging from the intensity with which cost statistics are being compiled, computed, confused and confounded, higher education is in real danger of being accused of knowing the price of everything and the value of nothing. . . . Unless administrators have determination as well as data, unless they are supported by aggressive associations able to point the way instead of pointing fingers, unless boards of trustees, the public, even students, know what education is and are convinced that it is worth defending, the most sophisticated of cost studies will be meaningless. Worse than meaningless, they become harmful, because there is nothing more mean than a statistical mean that becomes a standard, permitting no deviation (Switzer 1973, pp. 17–18).*

Summary and Implications

Most of the literature on which this monograph is based can be described as idiographic; that is, each report or article centers on a single institution. A small portion represents research on the practices of two or more institutions; consequently, the extent to which these findings can be generalized is restricted. What may have been useful in one situation may not prove equally useful in another.

Summary

The cost of an academic unit is measured most readily by examining its direct costs. The financial accounts maintained for a unit provide the clearest definition of those costs. Typically, they are the accounts for which the academic unit is explicitly budgeted. These costs, however, provide only partial data about the unit's full cost.

The concept of full cost recognizes that the contribution of other academic and nonacademic support units like the physical plant and general institutional administration must be considered as part of an academic unit's cost. A number of institutions are implementing the premise that all costs of the institution are ultimately for the benefit of its academic units and should be assignable to them. The adoption of a system for identifying and allocating indirect costs represents a critical decision about how all units within an institution should be viewed.

The technical task of identifying and assigning indirect costs involves another set of important decisions. The volume of activity in an academic unit and the space it occupies are two elements used widely in the formulas. SCH and FTE-student are often selected as indicators of volume. No clear preference between them is evident; little discussion of their relative advantages and disadvantages is reported in the literature. Agreement on the criteria for allocating indirect costs centers on the following points:

1. The method distributes costs in proportion to services received.
2. The data used in distributing indirect costs are simple and inexpensive to collect.
3. The results of the method provide the level of accuracy needed for the intended purpose.

Costs, direct or indirect, do not necessarily relate to the number of students served or faculty in a linear manner. Some costs are fixed, others variable. These qualities of cost are particularly important in the analysis of relatively small academic units, where the range of reactions to changes in SCH or FTE-students is limited.

In the technical realm of accounting, the concept of "realization" for recognizing a cost or revenue in the accounts is critical to the validity and completeness of data in those accounts. The accrual method of accounting, which incorporates the recording of encumbrances, is the standard supported most widely by organizations representing accountants and business officers. Consistency in recording and reporting is also cited as an important standard.

Accounting for revenues of academic units is not as well developed as accounting for costs. Where actual revenue attributable to a unit is not available in the accounts, some form of allocation system is used. The same criteria for allocating indirect costs are applicable to allocating revenue.

An important decision in the analysis of costs is the selection of the measure of unit cost. Cost per SCH and cost per student are used most frequently. One major study, however, opposes the application of SCH in expressing the cost of graduate programs, favoring instead a procedure for expressing costs by level.

Analysis of cost by class or instructor is less frequent but offers an alternative to a student-based index. The notion of "expected cost" for an academic unit provides a way to assess cost in terms of average faculty support and a unit's workload. Whether a student- or faculty-based index is used, mechanisms for weighting the index to reflect differences in the level of study, size of class, method of instruction, etc., are recommended for improving the validity of the measure.

Mathematical models, such as trend line analysis and the cohort-survival technique, offer means for projecting future enrollment and consequently revenue and expenditures that vary according to enrollment. For projecting course enrollments from students who have been admitted, an induced course load matrix may prove useful. No specific techniques for forecasting revenue or expenditure directly are discussed in the literature sampled.

"To each according to need" characterizes the use of resources by an academic unit based on its priority in the institution. The view that cost is related to revenue holds that each academic unit should be self-sufficient. For the time covered by the literature, the former view is more prevalent.

Relating cost to quality, or fiscal efficiency to program effectiveness, is surrounded by warnings about the limitations and potential misuses of quantitative data. Academic units, however, are sensitive to conditions of financial adversity Planning and evaluation should not rest alone on financial analysis, but their role in decision making is likely to be great in times of financial difficulty.

Research Needs

Several technical problems remain unresolved. Techniques for the identification and allocation of indirect costs need further testing and refining. The units of measure selected to represent an academic unit's share of indirect cost should be evaluated carefully to ensure equity in the distribution.

Changes in accounting systems or alternative methods for allocating revenue to academic units should be tested. A greater proportion of revenue should represent a unit's actual revenue than is possible to identify now in most accounting systems.

Investigation is needed to ascertain which costs should be treated as fixed costs and which as variable costs. The patterns of variability in costs need to be charted more thoroughly and their predictive capacities tested.

More comparisions of techniques within and among institutions would add empirical evidence for judging the effects of the techniques. The ability

to generalize the applicability of techniques to various types of academic units and institutions is limited now.

The role of financial analysis for academic units in decision making pertaining to units and institutions should be studied. On what issues and to what extent does this type of financial analysis influence decisions? Who uses this information and for what purposes do they use it?

Little is known about the effect of the implementation of financial analysis on faculty—how they view their responsibility in the implementation and how they view the impact of such analyses on the role of the professor. What knowledge of or attitudes toward financial analysis at the academic unit level do faculty hold? How does the form of governance of academic units or institutions relate to faculty views on financial analysis? Do these techniques tend to polarize administrators and faculty?

Some problems that contain philosophical questions as well as research needs also emerged from the review of the literature. For example, if indirect costs are allocated to an academic unit, what should be the unit head's accountability for it? Should the administrators of the units represented by the indirect cost be accountable to the administrators of the academic units? In what ways can the head of the academic unit influence indirect costs?

Should revenue, other than from grants and contracts, be attributed to academic units? How will describing units by revenue received affect their purpose? Will units whose revenue exceeds expenditures be unquestioned on other criteria? Will academic units need to justify themselves on their cost-revenue relationship before being evaluated on other bases? Will the quest for revenue produce unhealthy competition between academic units? For example, recognizing revenue only for SCHs produced within a unit produces a disincentive for promoting interdisciplinary study. Will units compromise quality to gain short-term advantages in their cost-revenue relationship?

What are the implications of expressing the cost of an academic unit per student? Instruction is generally delivered to students in groups rather than as individuals.

Of paramont need are studies to investigate the effects of financial analysis of academic units on the quality of academic programs. To what extent are the warnings cited in the literature justified? What is the legitimate cost of quality?

Recommendations

Administrators of academic units, institutional planners, and budget officers should be informed about the tools of financial analysis applicable to academic units. The limitations and potential of those techniques should be understood. Various techniques should be tested to identify those of most value in a given situation.

The cost of an academic unit should be analyzed in terms of its full cost. Both its direct and indirect costs should be identified. These costs should be scrutinized further based on their fixed and variable elements. Generally

accepted principles of accounting should be applied in recognizing cost; the accrual method is recommended for recording costs.

The identification of revenues for academic units represents a significant departure from traditional practice at most institutions. All relevant parties must understand the implications of identifying revenue at this level and of the likelihood that cost-revenue relationships will then enter into decision making about a unit. If revenue is identified at the level of academic unit, accounting procedures should be implemented so that actual revenue by unit can be easily recorded. General, unrestricted revenue should be allocated to the various units.

Projected revenue and costs that vary directly according to student enrollment should be based on accurate data. Trend line analysis, the cohort-survival technique, and the induced course load matrix should be tested for their validity in projecting enrollment for the institution and for the academic unit.

Index numbers are a useful means of depicting changes in financial data across time. Fluctuations in the value of the dollar should also be recognized in the analysis of financial data spanning several years.

The measure selected to represent unit cost, e.g., cost per SCH or cost per course, should take into account the level of study, nature of instructional technique, size of class, and other factors that may be relevant at a particular institution. The measurement of expected cost per unit or per FTE-faculty is recommended as a way to incorporate average faculty support and workload into cost analysis. Any measure of faculty activity, however, should be tested carefully to ensure its validity and reliability.

The results of the financial analysis of an academic unit must be considered in conjunction with other forms of analysis. The state of the art does not justify its use in isolation of other methods of evaluation. Decisions about an academic unit should reflect its quality and priority in an institution. Its cost or cost-revenue relationship should not be the sole or primary basis for judging its performance.

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